

YEAR 4 SCIENCE – STATES OF MATTER

KNOWLEDGE ORGANISER



What have we learnt in this topic before, what we will learn this year and what will we learn next?

In Year 2, we learnt in our topic: Uses of everyday materials (Materials for different uses)

- To identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
- To find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching
- Our Focus Scientist was **John McAdam-building roads**

In Year 4, we will learn:

- To compare and group materials together, according to whether they are solids, liquids or gases
- To observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- To identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
- Our focus Scientist will be: **Spencer Silver – Materials - Post it notes**

In Year 5, we will develop this further and learn about Properties and Changes of materials including

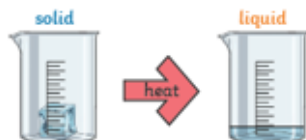
Dissolving, reactions & separation.

PARTICLES – FREEZING AND MELTING

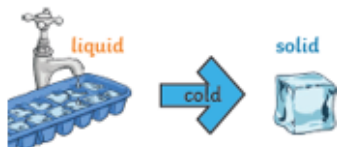
Particles are what materials are made from.

- They are so small that we cannot see them with our eyes.
- The **properties** of a substance depend on what its particles are like, how they move and how they are arranged
- Particles behave differently in **solids, liquids**

Solids and liquids can be changed from one state to another by heating or cooling.



If a solid is heated to its **melting point**, it **melts** and changes to a liquid. This is because the particles start to move faster and faster until they are able to move over and around each other.



When **freezing** occurs, the particles in the liquid begin to slow down as they get colder and colder. They can then only move gently on the spot, giving them a **solid** structure. The **temperature** at which water turns to ice is called the **freezing point**. This happens at 0 degrees C.

SOLIDS, LIQUIDS AND GASES

What is a solid?



- In the **solid** state, the material holds its shape.
- Solids** have **vibrating particles** which are closely packed in and form a regular pattern.
- This explains the fixed shape of a solid and why it can't be poured.
- Solids** always take up the same amount of space.

What is a liquid?



- In the **liquid** state, the material holds the shape of the container it is in.
- This means that **liquids** can change shape, depending on the container.
- Liquids** have **particles** which are close together but random.
- Liquid particles** can move over each other.
- Liquids** can be poured.

What is a gas?



- In the **gas** state, **particles** can escape from open containers.
- Gases** have **particles** which are spread out and move in all directions.

THE WATER CYCLE

Water on Earth is constantly moving. It is recycled over and over again. This recycling process is called the water cycle.

- Water evaporates into the air**
The sun heats up water on land, in rivers, lakes and seas and turns it into water vapour. The water vapour rises into the air.
- Water vapour condenses into clouds**
Water vapour in the air cools down and changes back into tiny drops of liquid water, forming clouds.
- Water falls as precipitation**
The clouds get heavy and water falls back to the ground in the form of rain or snow.
- Water returns to the sea**
Rain water runs over the land and collects in lakes or rivers, which take it back to the sea. The cycle starts all over again.



FOCUS SCIENTIST – SPENCER SILVER – POST IT NOTES

Dr. Spencer Silver, a 3M scientist, was busily researching adhesives in a laboratory. In the process, he discovered something peculiar: an adhesive that stuck lightly to surfaces but didn't bond tightly to them. "It was part of my job as a researcher to develop new adhesives, and at that time we wanted to develop bigger, stronger, tougher adhesives," said Silver. "This was none of those." What Silver discovered was something called **microspheres** which retain their stickiness but with a "removability characteristic," allowing attached surfaces to peel apart easily.



Key Vocabulary

melt freeze evaporate condense precipitation cooling condensation evaporation solids liquids gases particles water cycle process

YEAR 4 GEOGRAPHY – LOCAL ENVIRONMENTAL ISSUES

KNOWLEDGE ORGANISER



What have we learnt before in Geography and what we will learn next?

In Year 3, we developed our map skills and also compared our locality (Hemel Hempstead, and its human features,) to Venice.

In Year 4, we will focus on our local area specifically looking at the redevelopment of 'The Water Gardens' and thinking about ways in which humans try to improve their local area. We will also think about other local environmental issues and design posters and make speeches to try to address these with our school community.

In Year 5, we will continue to develop our map skills. We will extend our learning about localities by comparing and contrasting the UK with South America.

LOCATING THE WATER GARDENS

We can use different maps and images to locate an area and to also understand what it actually looks like.



Online and paper maps can help us to navigate an area and to locate where it is in relation to local roads and features but they are not as useful at helping us to imagine what that area actually looks like.

Aerial photographs can help us to understand what an area actually looks like and helps us to identify features of that locality. They may not be as helpful in finding the area or locating how to get there as they do not include things like street names.



CHANGES IN OUR LOCAL AREA



From our school playground, we can see 'The Water Gardens' (also known as the Jellies Water Gardens'. This area, close to our town centre, was redeveloped between 2011 and 2016 at a cost of over £2 million. This was to make this area more enjoyable and useable for the residents of Hemel (Human Geography). It was redesigned by a company called HTA and improvements included adding a wooden path, a flower garden, restoring the bridges and adding features such as vegetable patches and benches.

Key Vocabulary

- | | | | | | | | |
|-------------------|-------------------|---------------|---------|-----------------|--------------------|----------------------|-----------------|
| Online/paper maps | Aerial photograph | navigate | locate | Human Geography | Physical Geography | improve | redevelop |
| locality | environment | Water Gardens | traffic | pollution | responsibility | Environmental issues | harmful effects |

PHYSICAL AND HUMAN GEOGRAPHY

PHYSICAL GEOGRAPHY	HUMAN GEOGRAPHY
Physical geography is the study of landscapes and environments.	Human geography is the study of societies, cultures and economies.
Physical features like seas, mountains and rivers are natural. They would be here even if there were no people around.	Human features like houses, roads and bridges are things that have been built by people.
Physical Geography features in Hemel Hempstead include: <ul style="list-style-type: none"> The River Gade (at the Water Gardens) Gadebridge Park Shrub Hill Common 	Human Geography features in Hemel Hempstead include: <ul style="list-style-type: none"> The KD Tower The Train Station The Magic Roundabout The Skate Park The Industrial area



ENVIRONMENTAL ISSUES WHERE I LIVE

Environmental issues are defined as harmful effects to Earth and its natural systems due to the actions of humans. Environmental issues affect localities in different ways. For us at South Hill, we have identified a number of local issues including: littering, not recycling and using materials, pollution from traffic and redevelopment (which takes away green spaces).



YEAR 4 GEOGRAPHY – WHERE DO WE COME FROM?

KNOWLEDGE ORGANISER



What have we learnt before in Geography and what will we learn next?

THE EUROPEAN UNION

In Year 1, we learnt about where we live and began to use atlases and maps to identify countries and cities in the UK.

In Year 4, we will extend this by looking at the UK in more detail, as well as understanding the European Union and finding out about our own background and heritage.

In Year 5, we will extend this by looking at the UK in more detail and contrasting with geographical features of South America.

The European Union (EU) was formed to bring together the countries of Europe. The EU helps its member countries with issues such as trade, security, and the rights of citizens. By 2013 the group had 28 member countries. However, in 2016, one member—the United Kingdom—voted to leave the EU. The country officially left the union on January 31st 2020.

The EU countries are: Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.



THE GEOGRAPHY OF ME!

There are many things that make us who we are today. Each of us has a unique background and this is what makes us special and valued. There are lots of things that have made us who we are today, such as our:



- Nationality - where was I born? Where were my trusted adults born? This is our nationality.
- Ethnicity - the Government currently lists 18 different ethnicities in the UK. These are words used to describe groups of people who have something in common and who see themselves as distinctive in some way by having a common heritage or background.

As a class, we will carry out a survey to find out about our nationality and ethnicity and find out about our family background so that we can celebrate what makes us, us!

Key Vocabulary

Great Britain	British Isles	United Kingdom	city	town	village	capital city	island	The European Union	country
nationality	ethnicity	tropic of cancer	tropic of Capricorn	equator	continent	nationality	ethnicity	heritage	

THE BRITISH ISLES, THE UK AND GREAT BRITAIN



What is the difference between the British Isles, the UK and Great Britain?

The United Kingdom of Great Britain and Northern Ireland is a sovereign state (meaning it is ruled by a King or Queen) in the north west of Europe.

Great Britain is an island consisting of England, Wales and Scotland that is separated by the English Channel and North Sea. Northern Ireland is not a part of Great Britain. On a map, Great Britain is the larger of the two British Isles, on the right hand side.

The British Isles are a group of islands consisting of the islands of Great Britain, Ireland, the Isle of Man, the Inner and Outer Hebrides and over six thousand smaller islands. They have a total area of 315,159 km² (121,684 sq mi) and a combined population of almost 72 million, and include two sovereign states, the Republic of Ireland and the United Kingdom of Great Britain and Northern Ireland.

CITIES IN THE UNITED KINGDOM

There are currently a total of 69 cities in the United Kingdom: 51 in England, 7 in Scotland, 6 in Wales, and 5 in Northern Ireland. Cities are those places that have been granted city status by letters patent or royal charter.

These include: Bath, Belfast, Birmingham, Bradford, Brighton, Bristol, Cambridge, Cardiff, Carlisle, Dundee, Durham, Edinburgh, Manchester, Leeds, London and Glasgow.



YEAR 4 ART – MOUNTAINS AND REFLECTIONS

KNOWLEDGE ORGANISER



What have we learnt before in Art and what we will learn next?

In Year 3, we studied the artist 'Thomas Moran' and created our own watercolour landscape, depicting natural disasters. We focused on creating textures and using a background wash.

In Year 4, we will further develop our sketching skills to be able to show reflections, studying the work of Adrienne Pavelka as our inspiration. We will continue to develop our painting skills by using watercolour paints, concentrating on being able to mix the colours and shading these to create mood in our art work.

In Year 5, we will extend this by looking at the work of artist 'David Hockney'. We will focus on his use of bright colours to create mood and emotion in our paintings, using charcoal and watercolour.

DRAWING REFLECTIONS IN WATER

We can use pencil techniques to draw landscapes which are being reflected by a water source, such as a lake or river. To do this:

- Sketch out the main outlines of the objects using a pencil using the center of the page as your reflection line.
- Use symmetry to sketch the objects in their original position and in the mirror line (to reflect them).
- Shade the sky, adding layers of colour.
- Repeat process for the general landscape.
- Use a darker pencil to highlight edges to create contrast and shade to create shadows.
- Add in finer details over the top of the original colours.



FOCUS ARTIST – ADRIENNE PAVELKA



Adrienne Pavelka is a New Zealand artist whose special love is watercolour paintings. She began her artist career as a graphic designer. Her art is inspired by the effect of light on the landscape and the patterns of the sky.



Adrienne Pavelka's policy is not to let herself be influenced by other artists. She thinks that watercolours "create their own unexpected surprise".
<http://www.adrienne-pavelka.com/>

TINT, SHADE AND TONE

When we mix paints, we can add different colours to a base colour to create tints, shade and tone.



Tint



Shade



Tone



- Tint - add white to lighten the colour
- Shade - add black to darken the colour
- Tone - add grey to a colour

CREATING MOOD

To create mood in our paintings, we use things like colour selection, subject matter, brush technique, positioning of objects (composition).

Colour selection, including mixing our own colours, can help to give a distinctive mood to a piece of art work as colour can represent many different emotions.



Green	Yellow	Orange
Nature, cool, money, freshness, growth, sickness, jealousy	Happiness, warmth, cheery, laughter, lighthearted	Happiness, enthusiasm, energy, warmth
Blue	Purple	
Sadness, loneliness, cold, calm, serenity, freshness	Royal (purple was a colour used by royalty), expensive, wealth, power, luxury, nobility	

Key Vocabulary

Watercolour Adrienne Pavelka mix paint reflection symmetry reflection line light/dark mood
 Tint shade tone landscape 3d sketch outline brighten darken emotion select

YEAR 4 DT – MAKING BUNTING



What have we learnt before in DT and what we will learn next?

HISTORY OF TEXTILES/ SEWING

In Year 2, through our topic 'Construction/Use of Materials' we designed and made our own emergency vehicles.

In Year 4, we will design and make our own cross stitch keyring, as well as making our own bunting.

In Year 5, we will extend our skills through our topic 'Electrical and Mechanical components' by incorporating hydraulics and pneumatics.

Textiles are flexible materials woven from fibres, which have been used by humans throughout history for a number of purposes.

Textiles are used to make clothing, sheets, towels, linen, carpets, rugs and a wide variety of other products.

Sewing involves the joining of different textile fabrics using a needle and thread, either by hand or by a sewing machine.

Sewers can use a range of different sewing styles to produce strong joins as well as adding to the overall appearance and design. Thinking about the way a product looks is called 'aesthetics', and is highly important in textiles.



BUNTING

Bunting was originally a specific type of lightweight wool fabric generically known as *tammy* which was manufactured from the turn of the **17th century** and used for making **ribbons and flags**, including **signal flags for the Royal Navy**. Amongst other properties that made the fabric suitable for ribbons and flags was its **high glaze**, achieved by a process including hot-pressing. The origin of the word 'bunting' is uncertain but **bunt means colourful in German**.

Today, bunting is typically used to **decorate homes** and used **at celebrations as a decoration**.



Key Vocabulary

textiles material join decorate sew needle thread by hand sewing machine bunting flag
running stitch back stitch over sew blanket stitch cross stitch template grid applique aesthetic

TYPES OF STITCHES

Running Stitch – This is the simplest stitch. It creates a dotted line effect. Remember to leave a space from the previous stitch.

Back Stitch – Similar to the running stitch, except that the thread doubles back so that there is no visible spacing between stitches. It is a very strong and secure stitch.

Over Sew Stitch – The over sew stitch is a good way to neaten the raw edge of fabrics. It involves sewing over the edge of the fabrics.

Blanket Stitch – Another way to reinforce the edges of thick materials. This stitch is popular as it is thought to be aesthetically pleasing.



APPLIQUE

Appliqué is ornamental needlework in which pieces or patches of fabric in different shapes and patterns are sewn or stuck onto a larger piece to form a picture or pattern. It is commonly used as decoration, especially on garments. The technique is accomplished either by hand stitching or machine.

Appliqué is commonly practiced with textiles, but the term may be applied to similar techniques used on different materials. In the context of ceramics, for example, an appliqué is a separate piece of clay added to the primary work, generally for the purpose of decoration.



COMPUTING: DATA AND INFORMATION KNOWLEDGE ORGANISER

Overview

Data Logging



- Data is raw numbers and figures. Information is what we can understand from **analysing** data.
- There are lots of different ways that we can collect, log and interpret data, including by using data loggers.
- Data loggers and logging software can be used to automatically capture data. We can then draw conclusions in answer to our research questions.

Data Collection

Asking Questions: Data gathered over time can be used to answer important questions. For example, the class register can be used to answer questions about children's attendance. Before collecting data, we need to carefully consider which questions we are trying to answer.

	EXPERIENCE	SKILLSON	INHERIT
Sam			
Amelia			
Benji			
Farah			
Renee			
Oliver II			
Oliver I			

-Sensors: Our senses (sight, hearing, smell, taste, touch) detect things in our environment. Computers have input device sensors which help them to sense things.

Some examples are:

- Microphones (sound)
- Camera (light)
- Touchscreen (touch)



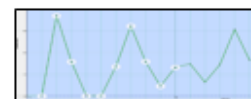
- Data Loggers: Data loggers have sensors built into them. They can be used to detect and record data. Data loggers often contain:

- A heat sensor (to record the temperature)
- A light sensor (to record brightness)
- A sound sensor (to record the noise).



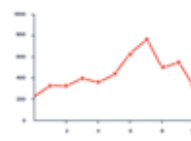
Data Recording

- One way for us to record data is by writing it down. Some data loggers can also record data themselves, which we can download later. Computers can also help us to record data, e.g. by connecting our data loggers to computers and opening data logging software.
- An advantage of this is that computers can record data automatically, meaning that someone does not need to sit waiting for a long period of time. Data loggers can be set to measure at different intervals (points in time).
- Data logger software can also be used to show different charts and graphs. This can save the user a lot of time!



Analysing Data

- When scientists collect data, they usually store it so that it can be **analysed** at any time. The data can also be shared so that other scientists can use it.
- Tables and graphs can be used to present the data in a useful way for reading and understanding it. It is important to be able to see trends as clearly as possible.



Answering Questions

- Remember that data should be collected for a reason: to answer questions.
- It is very important to ensure that the testing that you do is fair and reliable, otherwise the data that you get back may not give you the accurate answers that you need.
- It is important to interpret your data carefully. You can then write a report detailing what your conclusions are.

Important Vocabulary

Information

Data

Collection

Sensor

Logging

Analysis

Data Logger

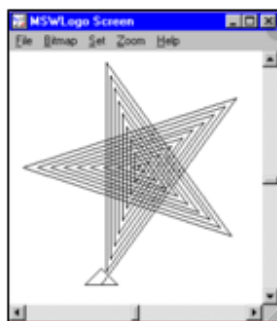
Software

Interpret

Conclusion

COMPUTING: PROGRAMMING KNOWLEDGE ORGANISER

Overview

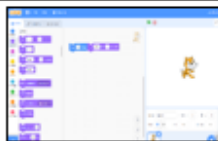


Repetition in Shapes

- **Programming** is when we make a set of instructions for computers to follow.
- **Logo** is a text-based program that we can use in order to create shapes and patterns.
- We use **algorithms** (a set of instructions to perform a task) which we can plan, model and test, in order to create accurate and imaginative shapes and patterns.

The Basics of FMS Logo

- **What is FMS Logo?** Logo is a text-based programming language, where we can type commands which are then drawn on the screen.
- Logo helps us to learn how to use programming language, whilst also being creative and using problem-solving skills.



The Display:



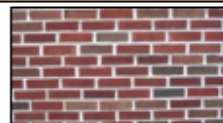
Basic Commands:



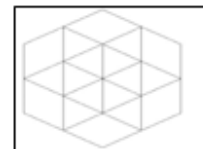
- **FD:** Forwards. Always followed by a space and the number of steps, e.g. FD 50
- **BK:** Backwards. As above, e.g. BK 50
- **LT:** Left turn. Always followed by a space and then the degrees to turn, e.g. LT 90
- **RT:** Right turn. As above, e.g. RT 90
- **CS:** Clears any pen marks on your screen and gets the turtle back to the **centre**.
- **PU:** Stops turtle from leaving a pen trail.
- **PD:** Makes turtle leave a pen trail again.

Programming Patterns

- **Patterns:** Patterns are things that repeat in a logical way. In everyday life, patterns are everywhere!



- **Patterns in Logo:** Instead of typing in the code to create each individual shape, we can save time by repeating a sequence of instructions. We use the 'repeat' function.



- **Repeat:** Type the command 'repeat' — this repeats commands a set number of times. The number following repeat is the number of times to repeat the code, and the code to be repeated is in square brackets, e.g. repeat 4 [FD 100 LT 90]

The above code will repeat FD 100 LT 90 four times.



- **Creating Shapes and Loops:** To make shapes, we need to know the angles of corners of different shapes (see right). Using the repeat function with shapes can help us to make spirals.



Sequencing and Algorithms

- A **sequence** is a pattern or process in which one thing follows another.

- We design **algorithms** (sets of instructions for performing a task) to help us program the sequence that we require to achieve our desired outcomes.

Algorithm	Code
1. Turn clockwise 90°	RT 90
2. Move forward 100	FD 100
3. Repeat	REPEAT 4 [RT 90 FD 100]
4. Turn clockwise 90°	RT 90

- **Programming** is the process of keying in the code recognized by the computer (using your algorithm).

Trialling and Debugging

- Programmers do not put their computer programs straight to work. They **trial** them first to find any errors:



- **Sequence errors:** An instruction in the sequence is wrong or in the wrong place.

- **Keying errors:** Typing in the wrong code.

- **Logical errors:** Mistakes in plan/thinking.



- If your algorithm does not work correctly the first time, remember to **debug** it.

Important Vocabulary

Programming

Logo

Turtle

Commands

Code

Cursor

Algorithm

Pattern

Sequence

Debugging

Prior Learning

Identified similarities and differences in sequences. Developed body management over a range of floor exercises. Attempted to bring explosive movements into floor work.

Unit Focus

Become increasingly competent and confident to perform skills more consistently. Perform in time with a partner and group. Use compositional ideas in sequences.

We are learning...

1. to perform a 6-element sequence that uses changes in speed and direction.
2. to use the STEP principle to create and perform a partner sequence.
3. to take weight on our hands, showing control.
4. to develop a sequence using compositional ideas, e.g. changing speed.
5. to co-operate as a group to refine a short sequence.
6. to compare and judge sequences.

Key Questions

1. How many compositional elements can you identify?
2. Did you use different pathways in your sequence?
3. What safety aspects do you need to consider when performing a cartwheel?

Equipment

Mats, hoops, cones, wall bars, bean bags, low apparatus, skipping ropes, ropes, action cards.

Vocabulary

Control, group, similar, different, direction, speed, partner, actions, compositional, stamina, leap, refine, progression.

Concepts

Basic gymnastics shapes are tuck, straddle, pike, star, dish, arch, L-sit, back support, front support, v-sit, bridge, straight, arabesque.

Assessment Overview

Head - Decide on ways to improve a piece of work using compositional elements and implement changes.

Hand - Demonstrate some control when taking weight on hands.

Heart - Adapt actions and sequences to work with partners and small groups.



Prior Learning

Built stylistic qualities through repetition and applying movement to one's own body. Built basic creative choreography skills in travelling, dynamics and partner work.

Unit Focus

Work to include freeze frames in routines. Practise and perform a variety of different formations in dance.

We are learning...

1. to use freeze frame in our dances.
2. to perform a slide and roll confidently.
3. to use a variety of formations when performing.
4. to extend our 'mission dance' phrases using canon.
5. to sequence our dance actions to show good flow.
6. to create a 5 action dance routine showing good 'stage' entry.

Key Questions

1. Why do we need to sequence movements? (so one move flows to the next).
2. Explain the different actions in your dance. Do they stick to the superhero theme?
3. What are some of the points in a slide and roll?

Equipment

Music player, music, cones, hoops, throw down spots, balloons, laptop internet access.

Vocabulary

Improvisation, rehearse, director, choreographer, slide, formation, freeze frames.

Concepts

Freeze frame (also known as still image) is like pressing the pause button on a remote control, taking a photo or making a statue.

Assessment Overview

Head - Demonstrate and discuss performance skills.

Hand - Perform with increasing musicality with control and confidence.

Heart - Work as part of a group to listen and give ideas.

